

REMARKS

Claims 9-27 and 29-32 are pending. Claims 29-32 have been amended to be in independent form. Support for the combination of hydrogen peroxide and glacial acetic acid can be found on page 12, lines 17-18. No new matter has been added by way of the above-amendment.

Issues Under 35 U.S.C. § 103

Claims 1-3, 7, 8, and 28-32 are rejected under 35 U.S.C. §103 as being unpatentable over Yasuyuki et al. (EP 0 584 597) taken with Kondo et al. (U.S. 4,208,490) or Burlett et al. (U.S. 5,118,546) or Hayashi et al. (U.S. 4,528,340). Applicants respectfully traverse the rejection.

The present invention is drawn to the modification of deproteinized natural rubber with a graft copolymerization reaction or an epoxidation reaction. The Examiner has applied the combination of Yasuyuki et al. and Kondo et al. with regard to the graft copolymerization reaction. Also, the Examiner has applied the combination of Yasuyuki et al. with Burlett et al. or Hayashi et al. with regard to the epoxidation reaction.

Applicants respectfully submit that the inventive process, as defined in the amended claims above, are not made obvious by the cited references. We now turn to the rejections.

GRAFT COPOLYMERIZATION REACTION

Applicants respectfully submit that the graft copolymerization reaction, as defined in the amended claims above, is not made obvious by the combination of Yasuyuki et al. and Kondo et al. Since Yasuyuki et al. are completely silent with respect to further modifying the deproteinized rubber by graft copolymerization, the Examiner is completely relying on the disclosure of Kondo et al. for this feature.

Kondo et al. teach that the graft copolymerization is performed with the following monomers:

[a]s the monomer component to be polymerized onto the rubber component, there may be used vinyl monomers, vinylidene monomers, vinylene monomers, etc. More specifically, the following monomers are exemplified: styrenic monomers (e.g. styrene,  $\alpha$ -methylstyrene, o-ethylstyrene, o-chlorostyrene, p-chlorostyrene, divinylbenzene), acrylonitrile and its related compounds (e.g. acrylonitrile,  $\alpha$ -chloroacrylonitrile, vinylidene cyanide), acrylic acid and its esters (e.g. acrylic acid, methyl acrylate, ethyl acrylate), methacrylic acid and its esters (e.g. methacrylic acid, methyl methacrylate, ethyl methacrylate, glycidyl methacrylate), vinyl esters (e.g. vinyl acetate), vinyl and vinylidene halides (e.g. vinyl chloride, vinylidene chloride), vinylketone, acrylamide, vinylpyrrolidone, maleic anhydride, maleimide, etc. These monomers may be employed alone or in combination. See column 3, lines 10-25.

Inventive claim 29 recites that the graft copolymerization is performed with 2-hydroxyethyl methacrylate. As can be see from this laundry list of possible monomers to use in the graft

copolymerization reaction, Kondo et al. do not include 2-hydroxyethyl methacrylate which is recited in inventive claim 29.

As the MPEP directs, all the claim limitations must be taught or suggested by the prior art to establish a *prima facie* case of obviousness. See MPEP § 2143.03. Since the combination of Yasuyuki et al. and Kondo et al. do not teach or suggest a graft copolymerization reaction with 2-hydroxyethyl methacrylate, a *prima facie* case of obviousness of claim 29 over the combination of Yasuyuki et al. and Kondo et al. cannot be said to exist.

Kondo et al. teach that the graft copolymerization is performed with the following polymerization initiators and chain transfer agents:

there may be used various conventional radical initiators, for instance, organic radical initiators such as azo compounds (e.g. 2,2'-azobisisobutyronitrile, 2,2'-azobisisovaleronitrile, 2,2'-azobis(2,4-dimethylvaleronitrile)) and organic peroxides (e.g. diisopropyl peroxydicarbonate, dilauroyl peroxide, di(3,5,5-trimethylhexanoyl) peroxide, dibenzoyl peroxide, t-butyl peroxy-2-ethylhexanoate, t-butyl peroxybenzoate, t-butyl peroxyaurate, dicumyl peroxide, t-butyl cumyl peroxide, t-butyl peroxide). They may be used alone or in combination.

As the chain transfer agent, there may be employed any material having a chain transference ability. For instance, alkyl halides, alkyl sulfides, alkyl disulfides, 1,4,5,8-tetrahydronaphthalene, terpinolene, thioglycolic esters, .alpha.-methylstyrene dimer and the like are usable. Among them, the use of alkylmercaptans is especially preferred. The addition of the chain

transfer agent to the polymerization system is usually effected all at once or portionwise prior to or in the course of polymerization. See column 3, lines 39-59.

Inventive claims 30 and 32 recite that the graft copolymerization is performed with a redox initiator which is a combination of t-butyl hydroperoxide and tetraethylenepentamine. As can be seen from this laundry list of possible redox initiators to use in the graft copolymerization reaction, Kondo et al. do not include t-butyl hydroperoxide and tetraethylenepentamine as recited in inventive claims 30 and 32.

Since the combination of Yasuyuki et al. and Kondo et al. do not teach or suggest a graft copolymerization reaction with a redox initiator which is a combination of t-butyl hydroperoxide and tetraethylenepentamine, a *prima facie* case of obviousness of claims 30 and 32 over the combination of Yasuyuki et al. and Kondo et al. cannot be said to exist.

#### EPOXIDATION REACTION

Applicants respectfully submit that the epoxidation reaction, as defined in the amended claims above, is not made obvious by the combination of Yasuyuki et al. with Burlett et al. or Hayashi et al. Since Yasuyuki et al. are completely silent with respect to further modifying the deproteinized rubber by epoxidation, the

Examiner is completely relying on the disclosure of Burlett et al. and Hayashi et al. for this feature.

Burlett et al. do not specifically teach how to perform the epoxidation reaction. On this matter, Burlett et al. state,

[a]s known to those skilled in the art, epoxidized natural rubber is a modified form of natural rubber in which some of the unsaturation is replaced by epoxide groups. Epoxidized natural rubber which may be used in the present invention may have a level of epoxide modification ranging from about 15 to 85 mole percent. Preferably, the epoxide level will be in the range of from about 20 to about 30 percent. A particularly preferred epoxide level is 25 percent. Representative of a epoxidized natural rubber which may be used is commercially available from The Malaysian Rubber Producers' Research Association under the designation ENR TM-25.

Accordingly, Burlett et al. are silent with respect to the use of trifluoroperacetic acid as recited in inventive claim 29, and the combination of hydrogen peroxide and formic acid as recited in inventive claim 31. Since the combination of Yasuyuki et al. and Burlett et al. do not teach or suggest an epoxidation reaction with trifluoroperacetic acid or the combination of hydrogen peroxide and formic acid, a *prima facie* case of obviousness of claims 29 and 31 over the combination of Yasuyuki et al. and Burlett et al. cannot be said to exist.

Hayashi et al. teach that the epoxidation is performed with carboxylic peracids as follows:

The carboxylic peracid is produced by the reaction of a corresponding carboxylic acid with a peroxide compound such as hydrogen peroxide. Therefore, the epoxidization reaction can be effected in the presence of a carboxylic peracid or a combination of a carboxylic acid with a peroxide compound, which react with each other in the epoxidizing reaction mixture to produce the corresponding carboxylic peracid.

The carboxylic acid is not limited to a specific type of carboxylic acid as long as it is provided with one or more carboxyl radicals and is capable of being converted to a corresponding peracid. However, it is preferable that the carboxylic acid be selected from saturated and unsaturated carboxylic acids having 1 to 10 carbon atoms, more preferably from saturated aliphatic carboxylic acids, still more preferably from saturated aliphatic monocarboxylic acids.

That is, the carboxylic acid usable for the process of the present invention is preferably selected from aliphatic monocarboxylic acids, for example, formic acid, acetic acid, propionic acid, n-butyric acid, iso-butyric acid, valeric acid, and caproic acid; aliphatic hydroxycarboxylic acids, for example, glycollic acid, lactic acid, hydroacrylic acid, 3-hydroxybutyric acid, glyceric acid, and gluconic acid; aliphatic halogenocarboxylic acids, for example, fluoroacetic acid, chloroacetic acid, chloropropionic acid, chlorobutyric acid, trichlorobutyric acid, and trichloroacetic acid; aldehyde-carboxylic acid, for example, glyoxalic acid; keto-carboxylic acid, for example, pyruvic acid, acetoacetic acid, and levulinic acid; aromatic carboxylic acids, for example, benzoic acid, substituted benzoic acid derivatives such as p-toluic acid, m-chlorobenzoic acid, salicylic acid, m-hydroxybenzoic acid, and p-hydroxybenzoic acid, and gallic acid, mandelic acid, and phenylacetic acid; polybasic carboxylic acids, for example, malonic acid, succinic acid, tartaric acid, malic acid, phthalic acids, and citric acid. See column 4, lines 29-66.

Inventive claim 29 recites that the epoxidation reaction is performed with trifluoroperacetic acid. As can be see from this laundry list of possible monomers to use in the epoxidation reaction, Hayashi et al. do not include trifluoroperacetic acid. Since the combination of Yasuyuki et al. and Hayashi et al. do not teach or suggest that the epoxidation reaction is performed with trifluoroperacetic acid, a *prima facie* case of obviousness of claim 29 over the combination of Yasuyuki et al. and Hayashi et al. cannot be said to exist.

Inventive claim 31 recites that the epoxidation reaction is performed with hydrogen peroxide and either formic acid or acetic acid. As can be see from this laundry list of possible carboxylic acids to use in the epoxidation reaction, Hayashi et al. list formic acid and acetic acid as just two of thousands. Applicants respectfully submit that in similar factual situations, the courts have not found the claimed invention obvious. Such a case is In re Baird, 29 USPQ2d 1550 (CAFC, 1994).

In Baird, there was an application claim for a flash fusible toner prepared using a bisphenol A. The Examiner rejected the application claim based upon a reference which taught a genus containing an estimated 100 million different diphenols simply because the reference genus encompassed bisphenol A. The Federal Circuit thought otherwise and overturned the Examiner's rejection.

Under Baird, the mere mention of formic acid and acetic acid as just two of thousands of possible carboxylic acids, does not render the inventive claim 31 obvious. As such, a *prima facie* case of obviousness of claim 31 over the combination of Yasuyuki et al. and Hayashi et al. cannot be said to exist.

Based on the foregoing, withdrawal of the rejection is respectfully requested.

#### Conclusion

In view of the above-amendments and comments, Applicants respectfully submit that the claims are allowable. However, should the Examiner find to the contrary, the Examiner is requested to enter this amendment into the Official Record, to place the claims in better form for appeal.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Garth M. Dahlen, Ph.D., Esq., (Reg. No. 43,575) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.




If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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